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ON THE

MODE OF ORIGIN

OF

SECONDARY CANCEROUS GROWTHS.

BY



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THE mode of origin in various parts of the body of the so-called "secondary growths," in persons who have laboured under the existence of tumours, or new formations belonging to that class, the members of which are usually styled "malignant," is a question concerning which much has been written, and is, moreover, one concerning which much doubt and uncertainty yet prevails in the mind of the profession. Considering it is a subject so continually and painfully brought under our notice in patients suffering from cancer, it may, perhaps, be interesting briefly to review the doctrines at present in vogue upon the subject, and ascertain how far they will bear the test of a rigid scrutiny, and whether some of them may not be found in a measure fanciful and unsupported, by what positive or probable knowledge we actually possess for the elucidation of the problem. Although an enquiry of this nature may present many points of interest in a strictly scientific aspect, it can only be deplored that in the present state of our knowledge, a corresponding advantage is not so likely to accrue from it to medicine as an art.

In this communication, I do not propose to enter into anything like a complete review of the question, but merely briefly to discuss the theories promulgated by some of the leading pathologists of the present day; and I propose to speak more particularly concerning the probable mode of origin of such cancerous growth, as have been produced at a distance from the site occupied by the primary new formation, and unconnected with it in any way, either by continuity of tissue, or mere contact of dissimilar parts.

But before commencing our inquiry, it may be well for us to bear in mind, that in judging of the chronicity or age of new formations, it is by no means always easy to ascertain which was antecedent to the other—whether the first formation occurred externally, and was followed by secondary growths in certain internal organs (one or many), or whether the growths in these organs were really primary and unmarked by notable symptoms—as occurs by no means rarely in cancer of the viscera—whilst the external visible growth, though the first seen or suspected, was really secondary. In very many cases, undoubtedly, there is not much difficulty in deciding this matter, but still, occasionally it is not so easy to form an opinion if we take into account the extreme variability in the rate of growth of different cancerous products, and hence the fallacious nature of the evidence presented by mere size and local disorganisation. Then, again, there may, in reality, be no difference in point of time—the two or many growths having as near as may be a simultaneous origin. These cases of coincidence as regards the time of origin of various cancerous growths in different parts of the body will be noticed further on, but now let us see by what means the occurrence of distinctly secondary and distant cancerous masses has been, or may be explained.

The following theories have been advocated by different pathologists to account for the production of this species of new formation :—

*First.* By inoculation, owing to the actual transference of cancer *cells* from the primary disease to the secondarily affected part, by means either of the circulation in the (*a*) veins, or in the (*b*) lymphatics, with their arrest and subsequent growth in these situations.

*Second.* The contamination of the distant part (through the same medium either of blood-vessels or lymphatics) by means of certain *ichorous juices* or *cancer blastemata*, which are supposed either (*a*) to produce some specific irritating effect upon the natural tissues, or (*b*) to have the power of developing there by acting themselves as germs or rudiments for the production of the new growth.

*Third.* The formation of the secondary growth, independently altogether of the primary, save and except its being an additional manifestation of an “error of nutrition” similar to that which has caused the first growth, which abnormal tendency may be due either (*a*) to congenital, and perhaps hereditary tendencies in the organism itself, or may be, as it were (*b*) a mere accidental and acquired deviation from the natural laws of growth and development; or, lastly, according to other views, these independent secondary forma-

tions are held to be due to the intensity of "blood disease," and consequent dyscrasia.

Let us now briefly consider these various possible modes of origin seriatim:—

I. (*a.*) The genesis of secondary cancer by the cells of the primary growth being conveyed to its new site by means of the blood circulating in the veins, has had, and I believe still has, many adherents. That the veins do sometimes contain cancer, and cancer cells, there can be no doubt, though when this occurs it is no longer believed that the cancer cells are capable of being absorbed by the venous radicles implicated in a cancerous growth in the same mysterious way as it was once believed pus cells were absorbed, in the production of that protean group of symptoms known under the name of pyæmia. Both doctrines have been well nigh consigned to oblivion; but the first condition is now generally admitted to occur from cancerous disease of the walls or lining membranes of the vascular system, and more especially of the veins. In these cases portions of the cancer project into the current of the circulation, and cancer cells are swept off and borne away by the rapidly moving blood. But having said thus much, I know not what more of certain knowledge we can add on this subject, since on following up the theory, we lose the guidance of ascertained facts, and are confronted by many difficulties. In the first place, the theory does not seem to be at all borne out by the usual sites in which we meet with these secondary growths, since the order of their production is by no means coincident with the course of the circulation. In numberless instances, when if this mode of propagation were potential we should expect to find cancer in the lungs, none is met with, whilst it is found in the liver, where theory does not require its presence. Then, again, granting that cancer cells are swept off into the current of the circulation, and arrested in the capillaries of certain organs, if this is to be the origin of cancerous new formations, what are we required to believe? Certainly things of which hitherto we have not had the slightest approach to what may be considered a distinct proof. We should have, for instance, to believe that one or several cells, separated from the parent formation, retained a sufficient degree of vitality and reproductive power to develop a growth similar to that from which they or it had been derived, and this, too, in a situation where, I believe, as yet, we have no evidence of new formations ever being produced, viz., free and unattached, within the vessels themselves. And if this method of growth seems improbable when the cancerous matter is, as it were, driven into a cul-de-sac in the capillaries, it seems even more impro-



bable that cancer-cells should become fixed, and grow on the inner surface of a large vein in the direct current of the circulation, though even so high an authority as Paget believes that this may occur. He says: "I have spoken of cases in which cancers so grow into veins that we cannot doubt fragments may be washed from them by the blood, and may grow wherever they come to rest;" (Sect. on Surg. Pathol., vol. ii., p. 579.) And, again, speaking of cancerous masses in veins, he says: "There are many in which the growth has only extended into the veins through their walls, involved in cancerous tumours, yet there are others in which, as in the endocardial cancers, the internal growth takes place far from any other tumour. In these we may believe that cancerous structures have been conveyed in the blood to the part of the vein, or of the right side of the heart, at which they have been arrested, and to which adhering (either alone or with blood clot), they have subsisted and grown on materials derived from the passing blood;" p. 536.

(b.) Respecting the transmission of cancer-cells by means of the lymphatics, almost nothing is known, though it seems highly probable that in one way or another they are principally instrumental in bringing about the infection of neighbouring lymphatic glands, which we so commonly meet with. Mr. Paget remarks: "The number of cases in which lymphatics filled with cancer have been traced from the primary growth to the nearest glands is sufficient to make it probable that the disease often thus extends continuously from the one to the other." (Loc. cit. p. 575.) And when such *continuity of cancer* cannot be traced, he agrees with Mr. Simon in thinking that the lymph may be sufficiently contaminated to set up disease in the glands. It seems to us also, that if cancer is ever reproduced by the transmission of cancer cells from the part primarily affected, and their subsequent growth, that this is far more likely to occur in the lymphatic system than in that of the blood proper, when we take into account the slow and languid current in which they are there immersed, in comparison with the rapid one to which they are exposed in the blood-vessels; and in this lymphatic system the cortical loculi of the lymphatic glands would seem to afford a haven and place for development freest from all disturbing influences. Although, therefore, it appears not only probable, but borne out by actual observation, that neighbouring parts may be infected through the agency of the lymphatics, yet still, as pointed out by Virchow, solid elements would necessarily be arrested at the first gland, and thus the progress of the cancer would be stayed till this, in its turn, acted as a fresh centre of infection.

II. (a.) Prof. Virchow is the great advocate of the opinion that secondary cancerous growths are produced by means of a specific irritation set up in the affected part or organ by certain ichorous juices derived from the primary cancer, and circulating with the blood. He says, speaking of the mode of propagation of secondary cancer both in adjacent and remote parts,—“there is one circumstance which especially favours the extension of such processes, namely, the abundance of the *parenchymatous juices* in the pathological formation.” (Cellular Pathology; transl. by Chance, p. 218.) And, again, after alluding to the improbability of infection occurring from the actual transference of cells in the current of the circulation, because the progress of the infection often advances in a direction contrary to that of the current of blood or lymph, “so that after a cancer of the breast, disease of the liver takes place, whilst the lung remains unaffected,” he says;—“The manner in which the metastatic diffusion takes place seems, on the contrary, to render it probable that the transference takes place by means of certain fluids, and that these possess the power of producing an infection which disposes different parts to a reproduction of a mass of the same nature as the one which originally existed.” A little further on he supposes that “an ichorous juice may pass from a cancerous tumour through the lungs without producing any change in them, and yet at a more remote point, as, for example, in the bones of a far distant part, excite changes of a malignant nature;” p. 219. And, lastly, “The forms (of cancer) yielding dry, juiceless masses, are relatively benignant. Those which produce succulent tissues have always, more or less, a malignant character.” P. 485.

Now, in the first place, in examining this hypothesis, do we invariably find that which Virchow seems to lay so much stress upon, namely, that the degree of malignancy of a cancer is to be always measured by the amount of parenchymatous juices which it contains? It appears not, for though Cruvelhier seems to regard cancer of the female breast as having a more than average tendency to affect the system generally, yet we are told by Dr. Walshe, in his elaborate work on “Cancer,” that “scirrhus is incomparably the most frequent species of cancer in the breast; encephaloid occurs in rare cases; while colloid, especially as constituting the mass of a tumour, is excessively uncommon.” These facts are, I believe, in harmony with the experience of most pathologists, and surely scirrhus is not that form of cancer which contains the largest amount of parenchymatous juices? When cancer exists at the same time in many internal organs, it is true that we usually find it to be of the encephaloid or sirrho-

encephaloid type, but then this, I imagine, is capable of receiving another explanation. Even granting, however, that there is invariably found to be that correspondence between the malignancy of a primary cancerous formation and the quantity of its parenchymatous juices, we shall even then find that the hypothesis requires the aid of two or three rather remarkable postulates to lend it support. We have to imagine that this cancerous juice, even when diluted to the extreme degree, that it must be by being mixed with the whole mass of the blood, not only possesses irritating properties capable of exciting certain morbid processes in particular parts of the system, but irritating properties of such a *special* nature as to cause the tissues acted upon to produce a growth similar in general characters to that from which the poisonous blastema was itself derived, and these effects too, be it remarked, are supposed to be produced by a fluid which, for ought we know to the contrary, and which all positive knowledge would lead us to believe (saving the exigencies of certain hypotheses), to be as bland and non-irritating in its nature as any other albuminous or fibrinous fluid in the body. This may at the first glance seem rather a bold assertion, but I think there can be little doubt that the unprejudiced inquirer will assent to its truth as a provisional statement, till real positive evidence shall decide in what manner the cancerous juice differs in composition and influence from other normal or pathological blastemata met with in the animal organism.

(b.) Mr. Paget believes that cancer *blastema* getting into the current of the circulation and becoming arrested in certain organs, has the power of *developing out of itself* the germs of a new cancerous growth. But how this could be affected, seems almost inexplicable, when we consider that this liquid blastema must necessarily, soon after mixing with the blood, be diffused through this vital fluid and thus be reduced as it were to a solution of extreme tenuity. The same difficulty too presents itself as in the case of the cancer cells, as to how and where any of this blastema could find an undisturbed resting-place in which to develop. Of course the very possibility of such an occurrence as the origination of cancer cells out of a perfectly homogeneous blastema, would be strenuously denied by all advocates of the cellular pathology, whose watchword is "*omnis cellula e cellula*."

In connection with these two supposed modes of propagation of cancer, either by means of cells or plasma, may be mentioned the experiments of Lebert and Langenbeck, concerning which Paget says, "There are cases in which by the inoculation of cancerous material into the bodies, or by the



injection of such material into the blood of dogs, cancer has seemed to be produced. I think that in a large number of experiments that result has been three times obtained; but it is quite possible that the dogs used for these three experiments were cancerous before the human cancerous matter was injected into them, for cancer is indeed a frequent disease among dogs." (Loc. cit. vol. ii., p. 542). So that it will be seen that but little, if any, support is rendered to the preceding doctrines by the results of these experiments, though they have sometimes been quoted as evidence in their favour.

III. We may also consider these secondary cancerous growths to have been produced in a manner entirely independent of direct influence from the primary formation, and to be developed under the agency of the same conditions that gave rise to the first growth. In many cases, indeed, of nearly simultaneous development of cancer in various parts or organs, the growths must almost necessarily be produced in this independent manner. In the language of the humoral pathologists, who look upon cancers as the "local manifestations of certain specific morbid states of the blood," wherein "are incorporated peculiar morbid materials which accumulate in the blood, and which their growth may tend to increase," this simultaneous or independent development of multiple cancerous growths, would be attributed to the "intensity of the cancerous cachexia."

But it may be explained also in a manner fully in harmony with the general doctrines of the cellular pathology; and that, too, I think, with the greatest deference for the learned and philosophical founder of this school, without the necessity of having recourse to the supposed irritating effects of cancerous juices. For in reality, what necessity is there for us to resort to other methods to explain the production of these secondary growths, different from those which are supposed to have given origin to the first? They are all tumours or new formations, and hence all alike come, in the apt and terse language of Paget, to be considered not only as hypertrophies, but "parts overgrowing, and as overgrowing with appearance of inherent power, irrespective of the growing or maintenance of the rest of the body, discordant from its normal type, and with no seeming purpose." The same errors of nutrition—whatever be their nature—that were sufficient by their deviation from the ordinary equable and normal mode of development, to give rise to these local manifestations of abnormal but inherent powers of growth, would surely be adequate to the production of other growths of a similar nature in different parts of the body. It seems

difficult to conceive any reason why, when we meet in the body with several new formations of a similar nature, it should be thought necessary—in the face, too, of so many difficulties—to assume that the first has been, in some obscure way, causative of its successors, when we have every right to imagine that the same causes were in operation during their production, as existed and probably helped in the genesis of the first.

Cancerous growths are tumours, and I know not why we should call into requisition agencies different for their production than those which we suppose to be potential in causing the genesis of other so-called “benignant” growths. It seems far more consistent to imagine that the former, like the latter, are in some way local manifestations of increased but misguided formative power, instead of supposing the former, or cancerous growths, to be produced after so exceptional a method as is necessitated by the requirements of the humoral pathology. This, looking upon the blood as the *fons et origo mali*, teaches us to believe that such growths are developed out of a specific blastema, segregated from blood, also specifically diseased, and which has been able to maintain its properties in a latent condition, through all the changes to which the vital fluid is hourly subjected—often through a long course of years—till the time comes when this blastema is poured out, which is to form the nidus and pabulum for the evolution of the malignant new formation. No such complicated phenomena seem necessary to us to account for the production of a simple fibrous tumour, and seem to be required no more for the formation of cancerous ones, if we only look at the question in such a way as the facts of the case seem to warrant.

Seeing, as we do, from actual observation, how frequently these so-called malignant growths are produced in a multiple manner, we may assume that there is an inherent tendency in the organism to the production of growths of this particular nature; just in the same way as we must suppose something similar to account for the extraordinary number of fatty or fibrous local aggregations, in the cases of multiple tumours of either of these types, which are from time to time met with in the body of the same patient. And the difference between the two cases seems to be this, that whereas in the case of fibrous tumours it is but rarely that such a disposition is manifested, and the progress of the several growths is for the most part slow; whilst, on the other hand, with cancerous products, this seems to be the rule, that the state of system, or tendency in the organism, which results in their formation, is of such an intensity and superior activity,

as to lead for the most part to the production of rapidly increasing growths in different parts of the body, either simultaneous or successive. And just as this tendency is capable of producing obvious and sensible alterations in nutrition, so may it also be capable of producing other *obscure and imperceptible* changes in the general nutrition of the body, such as fully to account for those cachectic conditions of the system so often met with, over and above what may fairly be ascribed to the effects of local irritation and ulceration produced by the various growths themselves.

The fact that where many cancerous formations exist in the same body, these are mostly found to be of the encephaloid type, may be only an index of the intensity of the diathesis; which is also borne out by the rapidity of their growth, and by the fact of their scarcely ever passing beyond the cell stage of development, and hence does not at all require that we should have recourse to the agency of their parenchymatous juices to explain this plurality.

We can readily imagine that a tendency of the organism so marked as this is seen to be from its results, may in many cases be handed down from parent to offspring, just in the same way as we see a close resemblance to the parental type in other respects, such as personal appearance, voice, manner, and mental peculiarities. But I see no difficulty either in our imagining that such a tendency or peculiarity of the organism may be also acquired in the course of life, through the slow and steady operation of certain hidden physical agencies operating upon the body; more especially when the activity of the processes employed in healthy nutrition are on the wane, at that post-meridianal epoch of life in which cancerous growths are most prone to form in the system.

Whilst, however, attempting in this paper thus to account for the production of cancer in distant parts of the body, I would by no means be understood to disbelieve in the possibility of its propagation to neighbouring parts by means of the lymphatics; I merely wished to point out some of the difficulties besetting the old doctrines entertained upon the subject, and also to suggest that there may, perhaps, be really no occasion for us to have recourse to such theories at all. And if it be objected that I have given no additional explanations instead, and but little more than a restatement of known facts concerning the phenomena of cancer, in lieu of the explanations, whose difficulties I have been endeavouring to unfold, I would ask whether we are able to explain any—even the most common—of physical facts, when brought face to face with what appear to be their ultimate manifestations. If we are thus impotent and powerless to explain

ordinary physical phenomena, how much more must we be baffled when we attempt to penetrate into the secrets of organic life? We are but too often obliged to content ourselves with a bare enunciation of facts, when we would fain give an explanation, and in dealing with obscure phenomena, whether physical or vital, it seems often better candidly to confess our ignorance rather than have recourse to tottering and untenable doctrines, in our endeavours to explain that which perplexes us. May we not well agree with Herbert Spencer when he says, in that most profound and philosophical work, his "First Principles," that "ofttimes the mark of the highest knowledge is the confession of ignorance."